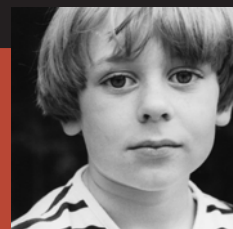
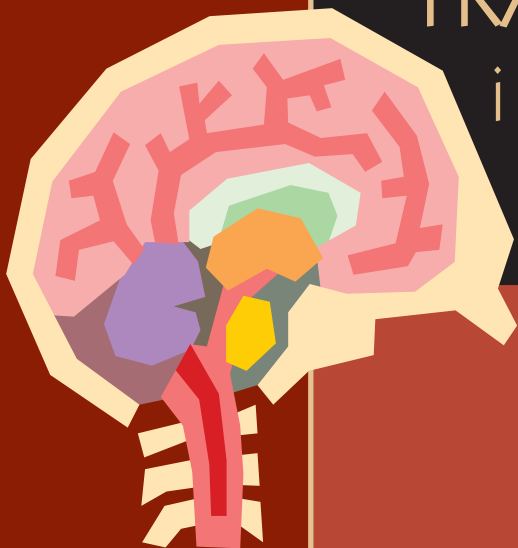


# TRAUMATIC BRAIN INJURY

## in Missouri



## State Action Plan

2007-2010



Missouri Head Injury Advisory Council  
Missouri Department of Health and Senior Services

Governor Matt Blunt  
Jane Drummond, Director

# Traumatic Brain Injury in Missouri

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Missouri Department of Health and Senior Services

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### Acknowledgements

The Missouri Traumatic Brain Injury State Action Plan for 2007-2010 was developed by the Missouri Head Injury Advisory Council in conjunction with its lead agency, the Missouri Department of Health and Senior Services. The plan represents a collaborative effort among members of the Missouri Head Injury Advisory Council, board members of the Brain Injury Association of Missouri and other stakeholders from across the state serving on the Traumatic Brain Injury Action Plan Committee.

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# Members of the Missouri Head Injury Advisory Council

**Charity F. Shelton, Chair**  
Missouri Rehabilitation Center  
Family Member of a TBI Survivor  
TBI Health Professional  
Mt. Vernon, MO

**Mariann Burnett Atwell, Psy.D.**  
Missouri Department of Corrections  
Jefferson City, MO

**Andrea D. Buening**  
TBI Survivor  
Seneca, MO

**Representative Shannon Cooper**  
Missouri House of Representatives  
Clinton, MO

**Betty Council**  
Missouri Department of Social Services  
Vienna, MO

**Representative Cynthia L. Davis**  
Missouri House of Representatives  
O'Fallon, MO

**William Michael Duff, M.D.**  
Health Professional  
Osage Beach, MO

**Leanna Depue**  
Missouri Department of Transportation  
Highway Safety Division  
Jefferson City, MO

**Donna English**  
Head Injury Survivor  
Jefferson City, MO

**Thomas Robert Forget, Jr., M.D.**  
Health Professional  
St. Louis, MO

**Timothy E. Imhoff**  
Bridges of Missouri  
Family Member of a TBI Survivor  
Health Professional  
Maryland Heights, MO

**John S. Korte**  
Missouri Department of Insurance  
Columbia, MO

**C. Jeanne Loyd**  
Missouri Department of Elementary  
and Secondary Education  
Jefferson City, MO

**Paula F. Nickelson**  
Director's Office  
Missouri Department of Health  
and Senior Services  
Jefferson City, MO

**Margaret Ellen Nichols, M.D.**  
Freeman Health Systems  
Health Professional  
Joplin, MO

**Robin Rust**  
Missouri Department of Mental Health  
Fulton, MO

**Tina Wood**  
Health Professional  
Jefferson City, MO

# Additional TBI stakeholders involved in developing the State Action Plan

**Peggy Barco**  
The Center for Head Injury Services  
St. Louis, MO

**Donna Borgmeyer**  
Governor's Council on Disabilities  
Jefferson City, MO

**Cathy Cartwright**  
University of Missouri-Columbia  
Columbia, MO

**Shawn DeLoyola**  
Missouri Protection and Advocacy Services  
Jefferson City, MO

**Kathleen Dolan**  
Rehabilitation Institute of St. Louis  
St. Louis, MO

**F. Scott Gee**  
Brain Injury Association of Missouri  
St. Louis, MO

**Donna Gunning**  
The Center for Head Injury Services  
Missouri Association of Rehabilitation  
Facilities  
St. Louis, MO

**LaDonna Henson**  
The Center for Head Injury Services  
St. Louis, MO

**Tim Landwehr**  
TBI Survivor  
Springfield, MO

**Imtiaz Mahmood**  
Missouri Department of Health  
and Senior Services  
Injury and Violence Prevention Program  
Jefferson City, MO

**Tom Martin, Psy. D.**  
Missouri Rehabilitation Center  
Brain Injury Association of Missouri,  
Vice-President  
Mt. Vernon, MO

**Susan Pritchard-Green**  
Missouri Planning Council for  
Developmental Disabilities  
Jefferson City, MO

**Sheila Rainey**  
Missouri Centers for  
Independent Living  
Jefferson City, MO

**Sheila Rider**  
Missouri Rehabilitation Center  
Brain Injury Association of Missouri  
Mt. Vernon, MO

**Pat Rowe-Kerr**  
State Veterans Ombudsman  
Missouri Veterans Commission  
Brain Injury Association of Missouri  
Jefferson City, MO

**Lisa Scott**  
Rusk Rehabilitation Center  
Columbia, MO

**Missouri Department  
of Health and Senior  
Services Staff**

**Lori Brenneke**  
Adult Head Injury Program Manager

**Gary Harbison**  
Bureau of Special Health Care Needs

**Karen Battjes**  
Bureau of Special Health Care Needs

The vision of the Missouri Head Injury Advisory Council (MHIAC) is excellence in traumatic brain injury (TBI) prevention, public awareness, and the provision of services and supports across the lifespan of people with brain injuries and their families.

To achieve this vision, the council's mission is to lead in the development of a collaborative statewide system of prevention, public awareness, and provision of services and supports driven by the needs of individuals with brain injury and their families.

The Missouri Traumatic Brain Injury State Action Plan was developed to serve as a guide to the MHIAC, keeping the council focused on the key priority goals and objectives. The council will determine specific activities as partnerships and resources are identified and opportunities arise. Just as collaboration with many key stakeholders was very important in the development of the State Action Plan, collaboration will be vital as the council moves ahead into implementation of the plan.

The council will look to identify partnerships that can leverage outcomes consistent with those identified in the plan. The council does not have the resources to accomplish this alone, but rather identifies itself through its mission as the organization that must lead in the establishment of these collaborative partnerships.

The implementation of this action plan brings the hopes of preventing TBI, increasing public awareness of TBI, and increasing services and supports for those who have survived a TBI and their families. While many TBI initiatives and programs have been established in Missouri during the past few decades, they form only a foundation. Missouri must continue to build upon that foundation to provide appropriate and accessible services to all persons who have been affected by a TBI. This action plan is a positive step forward in that direction.



Every year in Missouri, more than 1,300 people die and more than 12,000 people are treated at an emergency department or are hospitalized due to a traumatic brain injury (TBI). Many more people sustain a TBI but go undiagnosed and untreated.

TBI is defined as a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. Most TBIs are caused by falls, jumps, motor vehicle traffic crashes, being struck by a person or a blunt object and assault. Blast injuries sustained in combat are a growing cause of TBI.

TBI can range from mild to severe, and the effects can be temporary or permanent. Many people who experience a TBI have long-term or lifelong disabilities as a result of impairments in a number of areas including:

- Thinking and reasoning
- Memory
- Speech
- Behavior
- Seeing
- Understanding words
- Attention
- Problem solving
- Physical activities
- Hearing


These impairments can affect a person's physical, cognitive, behavioral, and emotional well-being, which subsequently impacts self-concept, family and social relations, education and learning performance. These secondary disabilities can cause significant long-term problems with independent living, community integration, employment and financial stability.

While TBI can affect men and women of all ages, males are about one and a half times more likely than females to sustain a TBI. The three age groups at highest risk are 0-4 years, 15-24 years, and 85 years and older. Military duties increase the risk of sustaining a TBI.

The short- and long-term consequences of a TBI create a significant public health burden across the country and in Missouri. Because TBIs affect different areas of the brain in different ways, no two brain injuries are alike. As a result, a range of services that can meet individual needs and change over time is necessary.

Improvements in health care and technology are helping people with TBIs live longer, healthier lives, so the need for services to assist those with TBIs and their family members is growing. Educating the public about TBI is vital to improving the lives of TBI survivors.

Because prevention is the only real cure for TBI, efforts to promote the use of seat belts, child safety seats and helmets and to prevent child abuse, domestic violence and other non-accidental injury are vital to reducing the number of people affected by TBI.



**T**raumatic brain injury can affect a person's physical, cognitive, behavioral and emotional well-being.

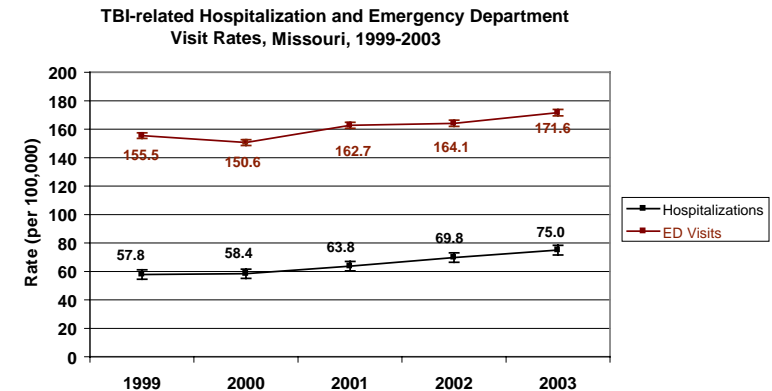
# THE BURDEN

Missouri has seen a troubling increase of 15.6% in the annual combined emergency department (ED) visits and hospitalizations related to traumatic brain injury (TBI). The rate of combined ED visits and hospitalizations increased from 213.3 per 100,000 in 1999 to 246.6 per 100,000 in 2003.

TBI is an insult to the brain that can result in multiple impairments and disabilities often leading to considerable loss of independence, productivity, and income potential.

Although there is no estimate for the number of people that experience a TBI and receive some type of medical care other than visiting an ED or being admitted to a hospital or who receive no care at all, there were still more than 14,000 TBI events each year in Missouri between 1999 and 2003. These events resulted in an average 1,320 deaths, 3,660 hospitalizations, and 9,082 individuals treated and released from the ED.

The leading causes of TBI in Missouri are falls/jumps, motor vehicle traffic crashes, being struck by a blunt object or by a person, and motor vehicle non-traffic crashes occurring off major roadways. All four mechanisms experienced a statistically significant increase during 1999-2003: falls/jumps increased 22.7%; motor vehicle traffic crashes increased 12.9%; struck by or against an object or person increased 16.1%; and motor vehicle non-traffic crashes increased 26.1%. These four causes



account for more than 90% of all TBI-related injuries in Missouri. Falls/jumps and motor vehicle traffic crashes each accounted for approximately 37% of all TBI-related hospitalizations.

The majority of TBI-related ED visits were from falls/jumps, motor vehicle traffic crashes, and being struck by or against a person or object. Missouri is annually averaging a greater combined percentage of ED visits and hospitalizations related to these mechanisms than the national annual average.

The populations at highest risk for TBI in Missouri were in the age groups of 0-4 years, 15-24 years, and 85 years and older. Males are more than 1.5 times as likely as females to sustain a TBI. African-American men are also more likely to experience TBI than females or white males. The overall age groups in Missouri demonstrating the highest combined ED visits and hospitalization rates for TBI from falls/jumps were those aged 0-4 and 85 and older. Motor vehicle traffic crashes related to TBI were highest among individuals 15-17 for females, 18-19 for males, followed by individuals 20-24.

Missouri has seen a troubling increase in traumatic brain injury in recent years.

TBI emergency department visits and hospitalization combined rates for being struck by or against an object or person were highest among individuals aged 15-17. TBI related to being struck by or against an object or person showed a statistically significant increase of 35.4% between the years 1999-2003. The 10-14 age group is most likely to go to the ED or be hospitalized for a TBI caused by a motor vehicle non-traffic crash. In addition, the overall trend in ED visits and hospitalizations, separately and combined, related to TBI in Missouri is increasing.

There are several Missouri counties that demonstrated higher combined rates of TBI-related ED visits and hospitalizations compared to the state average (226.5 per 100,000) based on the county of residence of the person seeking care for TBI. The six Missouri counties identified with the highest reported annual TBI combined rates during 1999-2003 were: Harrison (565.7), Ray (475.1), Clinton (443.3), Clay (420.3), Daviess (349.2), and Jackson (343.4).

The economic burden from medical care, disability, and death related to TBI is considerable. The total annual direct medical cost of TBI in Missouri was an estimated \$67 million. Indirect costs such as lost productivity due to TBI related mortality were an estimated \$795 million annually in Missouri. The state's Medicaid program bears substantial costs related to TBI. For the four-year period, 1999-2002, Medicaid net payments in the fee-for-service portion of the program paid over \$22.5 million related to TBI.

TBI creates a significant public health burden, both nationally and within the state of Missouri when the number of events, short- and long-term consequences, and costs are considered. Implementing evidence-

based and promising strategies offers key opportunities for reducing TBI in Missouri.

Interventions that are most likely to reduce the burden of TBI in Missouri include risk assessment and measures to reduce the risk of falls particularly in children and the elderly; use of safety equipment (e.g., child seats, seat belts, and helmets); reducing alcohol impaired driving; and behavioral interventions to reduce violence such as therapeutic foster care, early childhood home visitation programs, and limiting accessibility to firearms.

*This section excerpted from "The Public Health Burden of Traumatic Brain Injuries in Missouri." The entire report can be found on the Missouri Head Injury Advisory Council web site at: [www.dhss.mo.gov/HIA-Council/Priorities](http://www.dhss.mo.gov/HIA-Council/Priorities), select Missouri 2004, TBI, Public Health Burden of Traumatic Brain Injury.*

### Traumatic brain injury among the troops

Traumatic brain injury has been identified as the "signature wound" of the Global War on Terror. It is estimated that among American troops 10 percent of all troops and 20 percent of infantry troops have sustained a TBI. Military Medical Centers have reported that 60 percent of all blast injuries resulted in a TBI, and for Marines with blast injuries, 83 percent had a TBI. Dr. Deborah Warden, national director of the Defense and Veteran Brain Injury Center, has reported that the true proportion is probably higher because some TBI cases are not properly diagnosed.

*From "Supporting Our Troops: Understanding the New Parameters," by Marguerite David, MSW, LICSW, published at: [www.nasw-wa.org/cur\\_news/0207/supportingOurTroops.html](http://www.nasw-wa.org/cur_news/0207/supportingOurTroops.html).*



In 2004, the Missouri Head Injury Advisory Council (MHIAC) contracted with the University of Missouri-Columbia to conduct a needs assessment for traumatic brain injury (TBI) issues in Missouri.

The TBI needs assessment addresses the breadth and depth of need among persons with TBI and their families throughout Missouri. The goals of the needs assessment were:

- Goal 1:** Estimate the incidence and prevalence of traumatic brain injury in Missouri
- Goal 2:** Interview individuals with brain injury, their families and other key stakeholders
- Goal 3:** Identify brain injury service gaps in Missouri.

## Who participated in the needs assessment?

A key feature of the needs assessment is that it did not rely primarily on written surveys, which are problematic because they tend to be sent only to people who are already well-connected with the TBI service system (such as the Brain Injury Association membership lists and similar organizations). Even among the TBI service-savvy population, response rates for written surveys tend to be modest and often do not represent the needs of TBI survivors and families who are not as well connected.

The needs assessment study worked to remedy this bias by relying on outreach to various groups that would more likely represent the actual population of persons with TBI. For example, the Brain Injury Association contact lists were supplemented with lists of recent inpatients with TBI,

recent outpatients with TBI, community organizations who do outreach to persons with TBI, and urban and rural outreach to underrepresented populations.

## How did Missourians participate in the needs assessment?

The needs assessment did not rely on written materials such as surveys, because surveys can be difficult for some TBI survivors to understand and complete. Instead, the survey involved more time-intensive but necessary in-person and phone interviews that lasted from 30 minutes to 1½ hours. These interviews, combined with new focus group data, enabled the project to create an accurate view of the wide range of needs among people with TBI.

## How many Missourians have a brain injury?

The primary findings of the study suggest that incidence estimates for TBI in Missouri's population vary widely. However, given the most recent data available from the TBI Registry and the national Centers for Disease Control and Prevention (CDC), and accounting for the numerous biases toward under-reporting, the best estimates suggest that a total of between 18,300 and 24,832 Missourians will incur a brain injury each year. Of that total, only about one quarter will be hospitalized for TBI, and a relatively smaller proportion will experience lifelong TBI-related disability. In 2004, an estimated 114,089 living Missourians had received medical treatment for TBI.

The needs assessment report offers a number of relatively straightforward suggestions to ensure that Missouri's incidence and prevalence data are in

keeping with CDC guidelines and are as accurate and current as they can be given the limited resources available.

### What concerns did TBI stakeholders raise?

The stakeholder needs assessment consisted of two parts: 1) extended phone and in-person interviews with adult and child TBI survivors, family members, and TBI service providers; and 2) a statewide series of focus groups among key stakeholder groups.

By far the most common issues raised were related to a lack of TBI knowledge among agencies and service providers with whom people with TBI must interact, including schools, human services state agencies, health care providers and others. A second key issue related to poor service integration across state agencies and other service providers.

Another main theme of the assessment addressed service accessibility. Many participants reported that even where appropriate services exist, barriers such as difficulty navigating the system, transportation problems,

or funding issues interfered with delivering appropriate services in a timely manner.

Participants listed the following key barriers:

- Limited public knowledge of TBI
- Lack of coordinated state TBI policies
- Funding issues
- Lack of post-acute TBI services
- Lack of adequate family supports, transportation, and housing
- Substance abuse
- Traditionally underserved populations

*This section excerpted from the “Traumatic Brain Injury Needs Assessment.” The entire report can be found on the Missouri Head Injury Advisory Council web site at: [www.dhss.mo.gov/HIA-Council/Priorities](http://www.dhss.mo.gov/HIA-Council/Priorities), select Missouri 2004, TBI, Needs Assessment Phase 1.*



## Missouri Traumatic Brain Injury State Action Plan

**VISION:** Excellence in brain injury prevention, public awareness, and the provision of services and supports across the lifespan of persons with brain injuries and their families.

**MISSION:** To lead in the development of a collaborative statewide system of prevention, public awareness, and provision of services and supports driven by the needs of individuals with brain injury and their families.

### STRATEGIC PRIORITY 1:

#### **Reduce preventable brain injuries**

- Increase public awareness of preventing brain injuries
- Support prevention policy
- Reduce child abuse, domestic violence and non-accidental injury

### STRATEGIC PRIORITY 2:

#### **Increase the awareness and knowledge of brain injuries in our communities**

- Develop a marketing plan to educate targeted populations about brain injuries

### STRATEGIC PRIORITY 3:

#### **Ensure quality, accessibility and timeliness of services and supports across the lifespan**

- Reduce brain injury service gaps
- Increase brain injury service funding

### CHALLENGES:

- Limited public knowledge
- Lack of coordinated state traumatic brain injury policies
- Funding issues
- Lack of post acute traumatic brain injury services
- Substance abuse
- Lack of adequate family supports, transportation and housing
- Traditionally underserved populations

## Strategic Priority 1: Reduce preventable brain injuries

- **Increase public awareness of preventing brain injuries**
  - Collaborate with appropriate partners with a prevention focus
  - Build and promote a resource library
  - Promote Brain Injury Awareness Month
- **Support prevention policy**
  - Collaborate with appropriate partners
  - Reduce substance abuse in general public
  - Assist in promotion of prevention legislation
  - Encourage environmental improvements
- **Reduce child abuse, domestic violence and non-accidental injury**
  - Collaborate with appropriate partners
  - Promote current campaigns and programs
  - Encourage education of mandated reporters
  - Promote support programs



## Strategic Priority 2: Increase the awareness and knowledge of brain injuries in our communities

- **Develop a marketing plan to educate targeted populations about brain injuries**
  - Identify and prioritize target populations
  - Develop messages based on target populations
  - Identify potential partners for collaborative efforts
  - Implement and evaluate the delivery of messages to targeted populations



## Strategic Priority 3: Ensure quality, accessibility and timeliness of services and supports across the lifespan

- **Reduce brain injury service gaps**

- Identify current service gaps
- Review the current definition of traumatic brain injury in Missouri statute
- Identify partners for collaborative service and support delivery

- **Increase brain injury service funding**

- Develop partnerships to maximize funding
- Actively identify and pursue grant opportunities for the council and partners
- Maximize opportunities for federal funding for current and potential programs and services
- Promote and maintain the importance of the Head Injury Fund
- Identify and review other successful state funding systems



More information about traumatic brain injury  
can be found at: [www.dhss.mo.gov/TBI/](http://www.dhss.mo.gov/TBI/)  
For additional copies of this report visit:  
[www.dhss.mo.gov/HIA-Council](http://www.dhss.mo.gov/HIA-Council)



Missouri Department of Health and Senior Services  
PO Box 570  
Jefferson City, MO 65102  
1-800-316-0935 or TDD 800-669-8819  
<http://www.dhss.mo.gov>